

SUPPLEMENT

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Supplement 1: Narrative review of the remaining 9 ships.

Ovation of the Seas (Departed from Sydney, Australia on 12 March 2020)

On March 12, 2020, the Ovation of the Seas left Sydney, Australia for a round-trip voyage to New Zealand carrying roughly 3,800 people. However, due to the COVID-19 pandemic, the ship was refused entry to port in New Zealand. The ship returned to Sydney on March 18th without docking anywhere else and all passengers were allowed to disembark. The first positive case linked to the Ovation of the Seas was identified on March 20[1]. Guests were notified of their potential exposure via an email sent on March 22. 109 people, including 107 guests and 2 crew members, became sick and 1 guest died.

Greg Mortimer (Departed from Argentina on 15 March 2020)

The Greg Mortimer departed from Argentina on 15 March 15 2020, for a planned 16-day trip to Antarctica and South Georgia with 132 guests and 85 crew on board[2]. However, the ship was forced to divert course for Uruguay after several passengers, including the ship doctor, presented with symptoms of COVID-19. The ship was quarantined in Uruguay. 128 of the 217 passengers tested positive. Eight passengers required hospitalization.

The outbreak on the Greg Mortimer cruise ship offers a unique opportunity for modeling, as all

guests and crew members were tested. A detailed report of the incident was published in BMJ by Ing et. al[3].

Celebrity Apex (Docked in Saint-Nazaire, France)

The Celebrity Apex was docked in Saint-Nazaire, France, with 1407 crew on board. Starting 7 March 2020, the crew were required to remain on the ship. However, multiple statements from crew members report that contractors working on the ship were not restricted from leaving and re-entering the ship[4].

On March 21st, Celebrity Cruises hosted a large in-person training for crew members, followed by a company-hosted party. Crew members report being encouraged to attend by Celebrity executives[4]. On March 23rd, the first case of COVID-19 was identified on board. On March 25th, crew members were given PPE to be worn outside their cabins. Ultimately, out of the 1,407 crew members onboard, 217 people tested positive. There were no deaths reported from this outbreak.

Pullmantur Horizon (Docked in Dubai, UAE)

Passengers disembarked the Pullmantur Horizon on 15 March 2020 and the ship was docked in Dubai, UAE. Crew reported that they were notified on 28 March 2020 that crew members had tested positive on March 26th after being taken off the ship to a local hospital. Crew was separated into two areas on the ship. On April 4th, crew reported 150 cases out of 250 people

on board the ship. Information regarding this outbreak is limited, as all information was provided by anonymous crew members to Crew Center[5].

Costa Atlantica (Docked in Nagasaki, Japan)

Like the Celebrity Apex, the Costa Atlantica was not hosting guests at the time the COVID-19 outbreak was identified. In January, the ship docked in Nagasaki, Japan for repairs. 623 crew remained onboard. Crew were not allowed to disembark the ship after the onset of the COVID-19 pandemic. On 21 April 21 2020, the outbreak was identified. It was later reported that crew members had left the ship to go into town, despite orders not to. Crew were locked down in the ship and widespread testing was rolled out. A total of 149 crew members tested positive for COVID-19 as a result of the outbreak. There were no deaths reported[6].

Disney Wonder, Carnival Valor, and Celebrity Eclipse: These three ships have been grouped as they are reported to have over 100 cases associated with them in total, though no single outbreak onboard was reported to be over 100 cases.

Disney Wonder: There were three voyages associated with COVID-19, embarking on the following dates: 28/2/2020, 6/3/2020, 19/3/20. On the March 6th voyage, concerns were raised about a crew member showing symptoms of COVID-19. However, the crew member tested positive for Influenza A and B, leading to a de-escalation in concern. According to the Miami Herald, 36 total people tested positive for COVID-19 after this voyage. However, reporting after the March 19th voyage brings the true number of cases into question. Anonymous crew members have reported that there were over 200 positive cases on board after this voyage. However, there are no public reports from

Disney Cruise Lines or public health agencies about the total number of cases on this ship. The Miami Herald reports a total of 260 COVID-19 cases - 229 among crew, 31 among guests - associated with the Disney Wonder.

Celebrity Eclipse: The Celebrity Eclipse disembarked from San Francisco, CA, USA on March 1st. Passengers report that the crew staff had concerns about passengers who were experiencing COVID-19-like symptoms at the beginning of the cruise. However, cruise activities proceeded normally until the CDC's No Sail order was passed on March 15th. After this date, the ship reversed course near Chile to return to port in the US. On March 21st, cruise management hosted an event to honor healthcare professionals working to combat the COVID-19 pandemic, crowding passengers and crew onto the ship deck. On March 30th, passengers disembarked in San Francisco[7]. It is unclear when the initial cases were identified, but one day after disembarking passengers were notified via email of potential exposures on the ship[8]. There were 78 cases reported to be associated with this outbreak, though the Miami Herald reports a total of 123 cases associated with this ship.

Carnival Valor: A single case was denoted by Miami Herald for each voyage, as the total number of cases per voyage could not be validated. They report 132 total cases associated with this cruise ship.

Supplemental Table S1: Occupancy of guests and crew of cruise ships

Ship	Double occupancy of guests	Maximum occupancy of guests	Total capacity of crew	Occupancy percentage by cruise company
Adventure of the Seas	3,114	3,807	1,185	103
Black Watch	807	868	330	*
Braemar	989	1,075	400	*
Carnival Freedom	2,974	3,710	1,150	103
Carnival Imagination	2,056	2,594	920	103
Carnival Valor	2,968	3,710	1,150	103
Carnival Vista	3,954	3,954	1,450	103
Celebrity Apex	2,918	3,373	1,320	103
Celebrity Eclipse	2,852	3,000	1,500	103
Celebrity Flora	120	120	50	103
Celebrity Infinity	1,950	2,449	1,000	103
Celebrity Reflection	2,852	3,000	1,500	103
Celebrity Silhouette	2,852	3,000	1,500	103
Celebrity Solstice	2,852	3,000	1,500	103
Celebrity Summit	1,950	2,449	1,000	103
Coral Princess	1,950	2,491	980	103
Costa Atlantica	2,114	2,680	920	103
Costa Deliziosa	2,260	2,712	1,050	*
Costa Fascinosa	3,012	3,780	1,000	103
Costa Favolosa	3,012	3,780	1,050	103
Costa Luminosa	2,838	3,570	1,000	103
Costa Magica	2,688	3,470	1,000	103
Costa Victoria	1,928	2,200	800	103
Crown Princess	3,088	3,800	1,200	103
Diamond Princess	2,646	3,100	1,100	103
Disney Wonder	1,942	3,325	945	*
Enchantment of the Seas	2,252	2,730	852	103
Explorer of the Seas	3,286	4,290	1,185	103
Fridtof Nansen	528	600	150	*
Grand Princess	2,600	3,100	1,100	103

Greg Mortimer	120	160	74	*
Harmony of the Seas	5,479	6,780	2,100	103
Horizon	1,506	1,828	620	*
Liberty of the Seas	3,798	4,960	1,360	103
Majesty of the Seas	2,350	2,767	912	103
Marella Discovery 2	1,830	2,196	735	*
Marella Explorer 2	1,912	2,669	780	*
Mariner of the Seas	3,344	4,000	1,200	103
Mein Schiff 3	2,506	2,700	1,000	*
MS Marina	1,258	1,447	800	*
MS Paul Gauguin	318	332	217	*
MS Queen Victoria	2,014	2,250	1,253	103
MS Roald Amundsen	530	530	151	*
MSC Armonia	1,566	2,065	760	112
MSC Bellissima	4,488	5,386	1,400	112
MSC Fantasia	3,274	3,959	1,325	112
MSC Grandiosa	4,888	6,334	1,700	112
MSC Meraviglia	4,488	5,386	1,400	112
MSC Opera	1,756	2,055	730	112
MSC Orchestra	2,550	3,013	987	112
MSC Preziosa	3,502	3,960	1,300	112
MSC Sea View	4,132	5,331	1,413	*
MSC Splendida	3,274	3,959	1,325	112
MV Artania	1,188	1,260	537	*
Norwegian Bliss	4,200	5,200	1,730	104
Norwegian Breakaway	4,028	5,088	1,590	104
Norwegian Encore	4,266	5,218	1,731	104
Norwegian Gem	2,394	*	1,070	104
Norwegian Pride of America	2,186	*	927	104
Oasis of the Seas	5,400	6,296	2,165	103
Oceania Riviera	1,258	1,300	800	*
Ovation of the Seas	4,180	4,905	1,500	103
Pullmantur Monarch	2,356	2,772	827	*
Queen Mary 2	2,695	2,695	1,253	*
Rhapsody of the Seas	1,998	2,416	765	103
Ruby Princess	3,080	3,782	1,200	103
Sea Dream	112	112	95	*
Seven Seas Navigator	490	490	345	(e

Scarlet Lady	2,770	2,860	1,160	*
Silver Explorer	144	173	111	*
Silver Shadow	388	466	302	*
Sky Princess	3,668	4,402	1,350	103
Sun Princess	2,022	2,272	900	103
Symphony of the Seas	5,518	6,370	2,390	103
Vision of the Seas	2,036	2,443	765	103
Voyager of the Seas	3,282	3,938	1,181	103
Westerham	1,964	2,362	820	*
World Dream	3,376	3,400	2,000	*
Zaandam	1,438	1,440	561	*

Supplemental Table S1: Occupancy by cruise ship; * unable to find [9-25]

Supplemental Table S2: Ships of 20 to 99 cases of COVID-19 from January 2020 to October 2020

Ship	Date Embarkation	Date Passenger Disembarkment	Outbreak Identified	Location of Ship when Outbreak Identified	Number of Passengers at time of Outbreak	Number of Guests	Number of Crew	Number of COVID-19 PCR Tests Performed	Total Known Cases	Known Guest Cases	Known Crew Cases	Total Known Deaths	Known Guest Deaths	Known Crew Deaths	Attack rate	Mortality rate
Costa Luminosa	2/24/20	2/30/20	3/13/20	At Sea	4,570 [†]	3,570 [‡]	1,000 [‡]	-	3	3	0	1	1	0	0.1	33.3
Costa Luminosa	3/5/20	3/10/20	3/13/20	Marseille, France	1,780	1,370	410	-	65	13	50	7	6	1	3.7	10.8
MV Artania	12/21/19	variable	3/26/20	Fremantle, Western Australia	1,609	1,072	537	-	89	6	9	4	3	1	5.5	4.5
MSC Seaview	>14 days no passengers	-	4/30/20	Santos, Brazil	615	0	615	-	86	0	86	0	0	0	14.0	0.0
Celebrity Eclipse	3/1/20	3/30/20 [†]	4/3/20 [†]	San Diego, CA, USA	3,800 [†]	2,300 [†]	1,500 [‡]	-	78	69	9	2	2	0	2.1	2.6
Costa Favolosa *	3/9/20	3/19/20	3/26/20	Pointe-a-pitre, Guadelupe	4,789	3,780 [‡]	1,009	-	58	4	3	4	0	0	1.2	6.9
Costa Favolosa *	>14 days no passengers	3/19/20	3/26/20	Miami, FL, USA	1,009	0	1,009	-	2	0	2	1	0	1	0.2	50.0
Voyager of the Seas	2/25/20	3/7/20	3/21/20	Sydney, Australia	5,038 [†]	3,938 [‡]	1,100 [†]	-	1	1	0	0	0	0	0.0	0.0
Voyager of the Seas	3/7/20	3/18/20	3/31/20	Sydney, Australia	5,038 [†]	3,938 [‡]	1,100 [†]	-	52	43	6	2	2	0	1.0	3.8
Costa Fascinosa **	>14 days no passengers	-	4/12/20	Port of Santos, Brazil	764	0	764	-	49	0	49	5	0	5	6.4	10.2
Celebrity Flora	>14 days no passengers	-	4/14/20	North Seymour Island, Galapagos Islands, Ecuador	69	0	69	69	48	0	48	0	0	0	69.6	0.0
Carnival Freedom	3/8/20	3/14/20	3/25/20	Galveston, TX, USA	4,430 [†]	3,280	1,150 [‡]	-	1	0	1	0	0	0	0.0	0.0
Carnival Freedom	>14 days no passengers	3/14/20	4/3/20	Galveston, TX, USA	790	0	790	400	44	0	44	0	0	0	5.6	0.0

MS Roald Amundsen	2/16/20	3/26/20	4/4/20	Chile	681†	530‡	151‡		2	2	0	0	0	0	0.29	0.00
MS Roald Amundsen	7/17/20	7/31/20	8/1/20	Norway	363	209	154	154	37	1	36	0	0	0	10.19	0.00
Vision of the Seas ***	>14 days no passengers	-	5/25/20	St Vincent/ Grenada	356	0	356	356	36	0	36	0	0	0	10.1	0.0
Adventure of the Seas	>14 days no passengers	5/19/20	5/23/20	Trelawny, Jamaica	1,344	0	1,344	1,044	27	0	27	0	0	0	2.0	0.0
MSC Splendida	2/14/20	3/22/20	3/24/20	Marseilles, France	2,837	1,721	1,116	-	25	0	25	0	0	0	0.9	0.0
Costa Victoria	3/7/20	3/25/20	3/23/20	(At sea) returning to Italy from Mumbai, India	727	727	800‡	-	21	3	2	0	0	0	2.9	0.0
Celebrity Solstice	3/20/20	4/4/20	4/2/20	Sydney, Australia	4,500†	3,000‡	1,500‡	-	20	19	0	1	1	0	0.4	5.0

Supplementary Table S2: Cruises with between 20 and 99 cases of COVID-19; Red text = Approximate, when number of guests not known then maximum occupancy of guests used; Blue text= taken from SEC reports; [7, 26-59]

† indicates that numbers are approximate; when number of guests was not known, the maximum occupancy of guests was used

‡ indicates that numbers were taken from SEC reports.

Supplemental Table S3: Ships of less than 19 cases of COVID-19 from January 2020 to October 2020

Ship	Date Embarkation	Date Passenger Disembarkation	Date Outbreak Identified	Location of Ship when Outbreak Identified	Number of Passengers at time of Outbreak	Number of Guests	Number of Crew	Number COVID-19 PCR Tests Performed	Total Known Cases	Known Guest Cases	Known Crew Cases	Total Known Deaths	Known Guest Deaths	Known Crew Deaths	Attack rate	Mortality rate	Notes
Oasis of the Seas	3/8/20	3/15/20	3/28/20	Great Harbor Cays, Bahamas	1,650	0	1,650	-	17	0	17	3	0	3	1.03	17.65	11 people medevacked
MSC Opera	2/17/20	2/28/20	3/4/20	Athens, Greece	2,785 [†]	2,055 [‡]	730 [‡]	-	2	2	0	0	0	0	0.07	0.00	
MSC Opera	2/28/20	3/10/20	3/15/20	Genoa, Italy	2,785 [†]	2,055 [‡]	730 [‡]	-	10	10	0	0	0	0	0.36	0.00	
MSC Opera	-	3/10/20	3/15/20	Genoa, Italy	200 [†]	0	200 [†]	-	16	0	16	1	0	1	8.00	6.25	
MSC Bellissima	2/21/20	2/28/20	-	Dubai, UAE	6,786 [†]	5,386 [‡]	1,400 [‡]	-	2	2	0	0	0	0	0.03	0.00	
MSC Bellissima	2/29/20	3/7/20	-	Dubai, UAE	6,786 [†]	5,386 [‡]	1,400 [‡]	-	5	5	0	0	0	0	0.07	0.00	
MSC Bellissima	3/7/20	3/14/20	3/19/20	Dubai, UAE	6,786 [†]	5,386 [‡]	1,400	-	15	13	2	0	0	0	0.22	0.00	
Zaandam	3/7/20	variable	3/27/20	(At Sea) from Buenos Aires to San Antonio,	1,829	1,243	586	-	15	7	8	9	7	2	0.82	60.00	Denied entry in Chile, unknown # of passengers transferred to Rotterdam, crew remained on board
Coral Princess	3/5/20	4/4/20	3/31/20	Barbados	1,898	1,020	878	-	13	8	5	6	5	1	0.68	46.15	
MSC Preziosa	>14 days no passengers	-	4/30/20	Ocean Cay, Bahamas	1,300 [†]	0	1,300 [‡]	-	13	0	13	0	0	0	1.00	0.00	data from audio of captain's announcement
Marella Discovery 2	>14 days no passengers	3/7/20	5/20/20 [†]	-	735 [†]	0	735 [‡]	-	12	0	12	0	0	0	1.63	0.00	
World Dream	2/2/20	2/10/20	2/5/20	Hong Kong	3,691	1,871	1,820	1,800	12	12	0	0	0	0	0.33	0.00	
Mein Schiff 3	>14 days no passengers	3/23/20	5/1/20	Cuxhaven, Lower Saxony, Germany	2,899	0	2,899	15	10	0	10	0	0	0	0.34	0.00	usually max of staff is 1000 but it was higher as there were crew transferred from SCHIFF4 and Schiff 6 for repatriation, not able to have 1 person per cabin. Riot on 5/2 due to conditions/lack of pay
Enchantment of the Seas	>14 days no passengers	-	6/14/20	Trinidad	309	0	309	-	9	0	9	0	0	0	2.91	0.00	some crew remained at sea for more than three and a half months

Black Watch	>14 days no passengers	-	4/13/20	Rosyth, Scotland	330 [†]	0	330 [‡]	14	8	0	8	0	0	0	2.42	0.00	"Skeleton crew" on board so likely less than 330
Norwegian Pride of America	2/29/20	3/14/20	-	Honolulu, Hawaii, USA	3,113 [†]	2,186 [‡]	927 [‡]	-	1	0	0	0	0	0	0.03	0.00	
Norwegian Pride of America	>14 days no passengers	3/14/20	4/8/20	Honolulu Hawaii, USA	550	0	50	-	7	0	7	0	0	0	1.27	0.00	
MSC Fantasia	3/13/20	3/23/20	3/24/20	Lisbon, Portugal	2,624 [†]	1,299	1,325 [‡]	39	3	3	0	0	0	0	0.11	0.00	Portuguese nationals first to disembark on 3/23, other nationalities remained on board until Portuguese nationals tested positive then began rapid disembarkment 3/24/20, 39 Portuguese nationals tested, British Australians, Brazilians left untested
MSC Fantasia	>14 days no passengers	3/22/20	4/11/20 [†]	-	1,325 [†]	0	1,325 [‡]	-	7	0	7	0	0	0	0.53	0.00	crew recoding
Marella Explorer 2	3/15/20	3/26/20	3/25/20	Port Bridgetown, Barbados	980	200 [†]	780 [‡]	-	6	2	4	1	1	0	0.61	16.67	based on symptoms there were at least 19 passenger and 4 crew cases, unknown number repatriated to UK with flu like symptoms, 'many' staff with flu like symptoms
Silver Explorer	3/4/20	variable	3/14/20	Castro, Chile	231	111	120	-	6	6	0	0	0	0	2.60	0.00	
Braemar	2/27/20	3/17/20	3/9/20	St Maarten	1,512	1,128	384	-	5	1	4	0	0	0	0.33	0.00	The ship sat in the water for days without a solution with 682 passengers and 381 crew members. Had 28 guest and 27 crew on board with flu like symptoms that were not tested
Costa Magica	3/6/20	3/19/20	3/19/20 [†]	Pointe-a-Pitre, Guadeloupe	3,269	2,309	960	-	5	4	1	0	0	0	0.15	0.00	after passengers disembarked, crew remained on board, 3/24/20 6 crew had flu like symptoms and were medevacked to Miami hospitals, COVID-19 results not found
Fridtof Nansen	3/7/20	3/17/20	3/20/20 [†]	Portsmouth, England	488	388	100	-	4	4	0	1	1	0	0.82	25.00	
Mariner of the Seas	>14 days no passengers	-	4/1/20 [†]	-	1,200 [†]	0	1,200 [‡]	-	4	0	4	0	0	0	0.33	0.00	5/10/20 Crew member found dead, unclear cause

Norwegian Bliss	3/1/20	3/8/20	3/17/20	New York City	6,930 [†]	5,200 [‡]	1,730 [‡]	-	1	1	0	0	0	0	0.01	0.00	
Norwegian Bliss	3/1/20	3/8/20	3/17/20	New York City	6,930 [†]	5,200 [‡]	1,730 [‡]	-	2	0	2	0	0	0	0.03	0.00	
Norwegian Bliss	>14 days no passengers	3/15/20	4/21/20 [†]	FL, USA	1,730 [†]	0	1,730 [‡]	-	4	0	4	0	0	0	0.23	0.00	at least 100 ppl showed symptoms, 18 had 'pneumonias' and 4 were sent to Miami hospitals
Costa Deliziosa	>14 days no passengers	8/2/20	-	Rome, Italy	934 [†]	0 [‡]	934 [‡]	-	4	0	4	0	0	0	0.43	0.00	
MSC Grandiosa	>14 days no passengers	3/19/20	4/6/2020 [†]	Rome Italy	200	0	200	-	3	0	3	0	0	0	1.50	0.00	3 cases were all hospitalized
Norwegian Breakaway	2/29/20	3/7/20	3/18/20	Port Canaveral, FL	6,678 [†]	5,088 [‡]	1,590 [‡]	-	1	1	0	0	0	0	0.01	0.00	
Norwegian Breakaway	3/7/20	3/14/20	-	Port Canaveral, FL	6,678 [†]	5,088 [‡]	1,590 [‡]	-	3	3	0	0	0	0	0.04	0.00	numerous other passengers showed flu like symptoms but not tested, 2 cases from Westmorland County Pennsylvania thought from Norwegian Breakaway
Celebrity Infinity	3/9/20	3/14/20	3/23/20	Port Tamp, FL, USA	3,449 [†]	2,449 [‡]	1,000 [‡]	-	1	1	0	0	0	0	0.03	0.00	crew left on 5/21/20, positive on 5/23/20
Celebrity Infinity	>14 days no passengers	3/14/20	3/29/20	Miami, FL, USA	1,000 [†]	0	1,000 [‡]	-	2	0	2	1	0	1	0.20	50.00	
Liberty of the Seas	>14 days no passengers	-	3/30/20	Galveston, TX, USA	1,235	0	1,235	-	2	0	2	0	0	0	0.16	0.00	11 not confirmed crew were isolated with high temperatures
MS Queen Victoria	>14 days no passengers	early march	4/17/20 [†]	Southampton, England	1,253 [†]	0	1,253 [‡]	-	2	0	2	0	0	0	0.16	0.00	source from leaked audio
MSC Meraviglia	3/1/20	3/8/20	3/12/20	Miami, FL, USA	6,786	5,386 [‡]	1,400 [‡]	-	1	1	0	0	0	0	0.01	0.00	
MSC Meraviglia	3/8/20	3/15/20	-	Miami, FL, USA	5,277	3,877	1,400	-	2	2	0	0	0	0	0.04	0.00	Passengers not screened on disembarkation
MSC Orchestra	3/13/20	3/16/20	3/27/20 [†]	Mozambique (test in New castle)	4,487 [†]	3,500	987 [‡]	-	2	1	0	0	0	0	0.04	0.00	earliest symptoms 3/13-3/16, unclear test date
Seven Seas Navigator	>14 days no passengers	-	5/21/20	Barcellona, Spain	450 [†]	0	450 [†]	2	2	0	2	0	0	0	0.44	0.00	
Silver Shadow	3/7/20	3/22/20	3/12/20	Recife, Brazil	609	318	291	3	2	2	0	1	1	0	0.33	50.00	Different articles give total and # guests and crew, hence the discrepancy. Passengers spent 10 days the on cruise ship awaiting disembarkation, crew remained on board

Sun Princess	1/29/20	3/19/20	3/26/20	Fremantle, Australia	2,900	2,000	900+	-	1	1	0	0	0	0	0.03	0.00	Turned away from Madagascar and met with protests on Reunion island; Some passengers disembarked on Kangaroo Island on March 16th, 2020, and the rest disembarked in Sydney on March 19th, 2020
Carnival Imagination	3/5/20	-	-	-	3,514†	2,594‡	920‡	-	1	0	0	0	0	0	0.03	0.00	
Carnival Imagination	3/8/20	-	-	-	3,514†	2,594‡	920‡	-	1	1	0	0	0	0	0.03	0.00	
Carnival Imagination	3/12/20	-	-	-	3,514†	2,594‡	920‡	-	1	1	0	0	0	0	0.03	0.00	
Carnival Valor	2/29/20	3/5/20	-	New Orleans, USA	4,860†	3,710‡	1,150‡	-	1	1	0	0	0	0	0.02	0.00	
Carnival Valor	3/5/20	3/9/20	-	New Orleans, USA	4,860†	3,710‡	1,150‡	-	1	0	0	0	0	0	0.02	0.00	
Carnival Valor	3/9/20	3/14/20	-	New Orleans, USA	4,860†	3,710‡	1,150‡	-	1	0	0	0	0	0	0.02	0.00	
Carnival Vista	2/15/20	2/22/20	-	Galveston, TX, USA	5,404†	3,954‡	1,450‡	-	1	0	0	0	0	0	0.02	0.00	
Carnival Vista	2/29/20	3/7/20	-	Galveston, TX, USA	5,404†	3,954‡	1,450‡	-	1	1	0	0	0	0	0.02	0.00	
Celebrity Reflection	3/13/20	3/23/20	-	Fort Lauderdale, USA	4,500†	3,000‡	1,500‡	-	1	0	0	0	0	0	0.02	0.00	
Celebrity Silhouette	2/23/20	3/6/20	3/10/20	Ft. Lauderdale, FL, USA	4,500†	3,000‡	1,500‡	-	1	1	0	0	0	0	0.02	0.00	
Celebrity Summit	2/29/20	3/7/20	-	San Juan. Puerto Rico, USA	3,449†	2,449‡	1,000‡	-	1	0	0	0	0	0	0.03	0.00	
Crown Princess	3/6/20	3/16/20†	-	Ft. Lauderdale, FL, USA	5,000†	3,800‡	1,200‡	-	1	0	1	0	0	0	0.02	0.00	
Crown Princess	>14 days no passengers	3/16/20†	-	Ft. Lauderdale, FL, USA	1,200†	0	1,200‡	-	1	0	1	1	0	1	0.08	100.00	
Explorer of the Seas	3/8/20	3/15/20	-	Miami, FL, USA	4,294†	3,114†	1,180†	-	1	0	0	0	0	0	0.02	0.00	
Harmony of the Seas	>14 days no passengers	-	-	-	2,100†	0	2,100‡	-	1	0	1	0	0	0	0.05	0.00	
Majesty of the Seas	2/29/20	3/7/20	3/14/20	Gulfport, MS, USA	3,588	2,676	912	-	1	0	0	0	0	0	0.03	0.00	

Pullmantur Monarch	>14 days no passengers	-	4/17/20 [†]	Panama City, Panama	803 [†]	0	803 [†]	-	1	0	1	1	0	1	0.12	100.00	
MS Marina	>14 days no passengers	variable, before 3/23/20	-	Miami, FL, USA	800 [†]	0	800 [†]	-	1	0	1	0	0	0	0.13	0.00	
MSC Armonia	3/2/20	3/9/20	-	Miami, FL, USA	2,825 [†]	2,065 [‡]	760 [‡]	-	1	1	0	0	0	0	0.04	0.00	
Norwegian Encore	3/8/20	3/15/20	3/22/20	Miami, FL, USA	1,000 [†]	0	1,000 [†]	0	1	0	1	0	0	0	0.10	0.00	"Dozens" were sick but not tested
Norwegian Gem	>14 days no passengers	-	4/13/20	Great Stirrup Cay, Bahamas	1,070 [†]	0	1,070 [†]	-	1	0	1	0	0	0	0.09	0.00	3 deaths, including MD in cabin, not allowed to get off to get tests
Oceania Riviera	2/26/20	3/11/20	-	Miami, FL, USA	2,100	1300	800	-	1	0	0	0	0	0	0.05	0.00	
MS Paul Gauguin	7/30/20	8/2/20	8/1/20	Papette, Tahiti	340	147	192	-	1	1	0	0	0	0	0.29	0.00	
Queen Mary 2	-	3/14/20	3/31/20	Durban, South Africa	1,226	264	1,215	27	1	0	1	0	0	0	0.08	0.00	
Rhapsody of the Seas	3/7/20	3/14/20	-	Tampa, FL, USA	3,181 [†]	2,416 [‡]	765 [‡]	-	1	0	0	0	0	0	0.03	0.00	
Scarlet Lady	Not yet had first voyage	-	3/22/20	Miami, FL, USA	1,160 [†]	0	1,160 [†]	-	1	0	1	0	0	0	0.09	0.00	had not yet had maiden voyage
Sea Dream	7/21/20	7/28/20 [†]	8/4/20	Oslo, Norway	195 [†]	110 [†]	85 [†]		1	1	0	0	0	0	0.00	0.00	
Sky Princess	>14 days no passengers	"beginning of March"	-	Port Canaveral, FL, USA	1,300	0	1,300	-	1	0	1	0	0	0	0.08	0.00	
Symphony of the Seas	3/7/20	3/14/20	3/30/20	Everglades, FL, USA	2,390 [†]	0	2,390 [†]	-	1	0	1	1	0	1	0.04	100.00	up to 31 additional cases as per anonymous report, (including 2 nurses)
Westerham	2/1/20	2/13/20	2/15/20	Sihanoukville, Cambodia	1,528	781	747	-	1	0	0	0	0	0	0.07	0.00	

Supplemental Table S3: Cruises with less than 20 cases; [12 Red text = Approximate, when number of guests not known then maximum occupancy of guests used; Blue text= taken from SEC reports; 28, 41, 59, 60-140]

[†] indicates that numbers are approximate; when number of guests was not known, the maximum occupancy of guests was used

[‡] indicates that numbers were taken from SEC reports.

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